HiFluid
Driven by Reliability & Performance

Hydrogen Energy

Company Profile

HiFluid, located in Jinan, China, national high-tech enterprise, science and technology-based SME, has been focusing on providing safe, stable, intelligent, and customized solutions for advanced ultra-high-pressure fluid applications such as hydrogen compression, high-pressure testing, high-pressure processing (HPP), isostatic pressing etc. as well as pressure generation unit and control & transfer unit for standard ultra-high-pressure fluid systems since its establishment in 2019. Leveraging its core competencies in design, equipment, and quality assurance, the company is committed to helping customers minimize lifecycle operational costs through energy-saving technologies and extended maintenance intervals.

The company has achieved certifications for ISO 9001 Quality Management System, ISO 14001 Environmental Management System, and ISO 45001 Occupational Health and Safety Management System. We strive to differentiate ourselves from traditional suppliers by embodying the role of consultants and solution providers with our expertise and craftsmanship.

All greatness comes from a brave beginning.

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Why Invest in Hydrogen Energy

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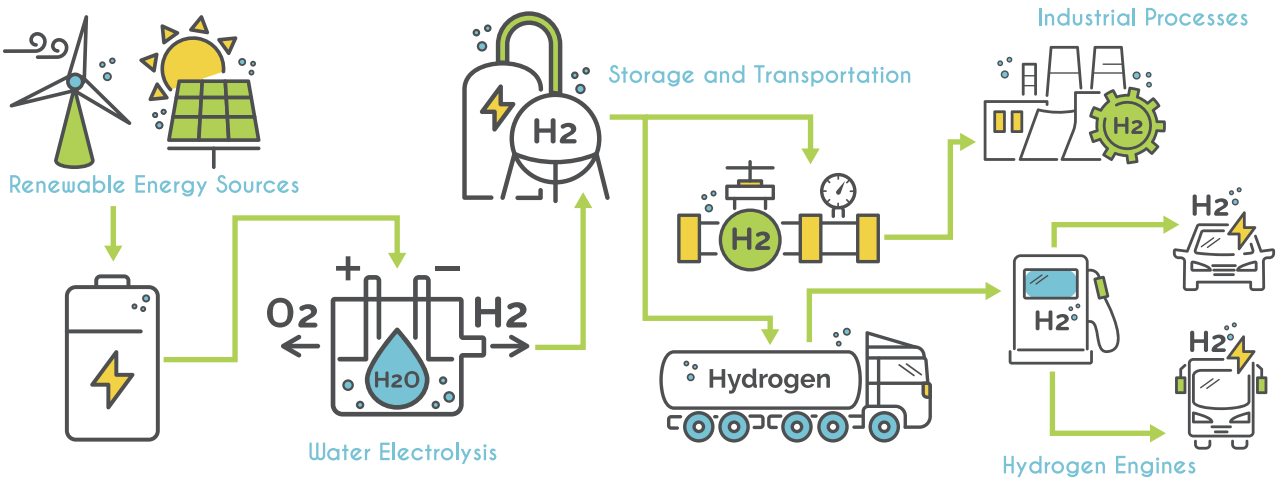

China's "Dual Carbon" transition is accelerating. The early achievement of the 2025 carbon-peaking target is being driven by the large-scale deployment of renewable energy and breakthrough decarbonization across key sectors such as transportation and industry. In this sweeping transformation, hydrogen is not only a critical pathway to deep emissions reduction, but also a core strategic pillar for strengthening energy system resilience and safeguarding energy security.

The global hydrogen industry is starting from the same baseline, and the decisive factors in competition are supply-chain capability and cost control. These are precisely the strengths of Chinese companies, and the foundation of HiFluid's confidence in this field. Since 2022, we have positioned hydrogen as a core strategic business line alongside Oil & Gas, Aerospace & Defense, and High-Pressure Processing.

Built on deep expertise in high-pressure fluid applications, HiFluid has rapidly established a comprehensive product portfolio for hydrogen, especially across refueling and testing. We deliver not only technology-leading system solutions, but also outstanding energy efficiency and extended maintenance intervals, helping customers fundamentally optimize total cost of ownership across the full lifecycle, and enabling shared growth in the hydrogen era.

Why Choose HiFluid Hydrogen Products
—Customized Solutions

HIFLUID

As an expert in customized and integrated solutions for the ultra-high-pressure fluid industry, HiFluid provides a one-stop service covering system design, manufacturing, factory testing, on-site installation, commissioning, and personnel training. This comprehensive approach effectively addresses the challenges of system integration for customers. All high-pressure core components are independently developed and manufactured by HiFluid, ensuring optimal compatibility between components and superior overall system performance. By avoiding the "barrel effect" commonly caused by combining equipment from multiple brands, HiFluid helps customers save both time and engineering costs.

1 Safe and Reliable

- All HiFluid products fully comply with, or exceed, the most stringent international standards and certifications in the industry, including ASME, PED, and CE. This ensures that every stage of design, manufacturing, and testing is conducted in accordance with established standards, with risks clearly defined and effectively controlled.
- Safety and reliability form the baseline of risk management. From the earliest design stage, safety considerations are fully integrated into our products, including pressure relief devices, overload protection, and safety interlock systems. These measures create a multi-layered safety protection framework that minimizes accident risks and safeguards both personnel and equipment assets.
- Before delivery, every product undergoes rigorous pressure proof testing, performance testing, and other validations at levels well beyond its rated operating pressure. This ensures maximum reliability and provides customers with safe, dependable products, while eliminating potential issues during on-site commissioning and operation.

2 Energy Efficient and Compact

- The hydrogen compressor is driven by a load-sensing pump or a closed-loop hydraulic pump, allowing the hydraulic system to dynamically adjust output in response to load demand. This represents a fundamental shift from "continuous power supply" to "on-demand power delivery." By eliminating throttling and overflow losses and enabling demand-based energy distribution, overall energy efficiency is significantly improved and operating energy costs are directly reduced.
- The closed-loop pump integrates functions such as charge pumping, safety valves, and flushing valves into a single compact unit. As a result, the entire hydraulic drive system features a highly compact design, reducing the number of external valve blocks and complex piping connections. Only a small-capacity oil tank is required for leakage compensation and heat dissipation, significantly minimizing equipment footprint and space requirements.

3 Intelligent Monitoring

- HiFluid's independently developed intelligent control platform serves as the core of the entire equipment control system. It enables one-touch start and stop, automated process control, and adaptive parameter adjustment, significantly reducing reliance on manual operation and ensuring standardized and stable operating conditions for both production and testing.
- The control system is equipped with advanced diagnostics and predictive maintenance capabilities. By analyzing real-time operating data, potential failures can be identified in advance, transforming maintenance from reactive repair to proactive prevention. This capability is critical to ensuring continuous operation and eliminating unplanned downtime.
- Real-time equipment data is seamlessly integrated with management platforms, providing upper-level systems with continuous data support. This enables digitalized and transparent data management, forming a solid foundation for optimized operational and strategic decision-making.

Why Choose HiFluid Hydrogen Products
—In-house Manufacturing of Core Components

HIFLUID

Amid the global energy transition, hydrogen energy has emerged as a strategic focus due to its zero-emission characteristics and high energy density. As the "nervous system" and "safety barrier" of hydrogen systems, core components such as boosters and high-pressure tubing, fittings, and valves directly determine the feasibility and reliability of practical applications. By deeply cultivating ultra-high-pressure fluid technologies, HiFluid's self-developed boosters and high-pressure components represent not only a practical solution to current industry challenges, but also a long-term strategic investment in building core industrial competitiveness.

1 Technical Compatibility

- Technical compatibility is a core strength of HiFluid's hydrogen solutions. Hydrogen molecules are extremely small, highly permeable, and prone to inducing hydrogen embrittlement, placing stringent requirements on material selection and structural design of system components.
- Off-the-shelf, general-purpose components often fail to meet the demands of specific operating conditions. HiFluid addresses this challenge through deep customization to achieve precise technical matching. Its hydraulically driven gas boosters and pneumatically driven gas boosters are designed to meet explosion-proof requirements, with maximum output pressures of up to 150Mpa. These capabilities make them ideally suited for high-pressure compression requirements in green hydrogen production, while also allowing flexible application in hydrogen refueling and related operating conditions.
- The associated high-pressure tubing, fittings, and valves support working pressures of up to 138Mpa. Through the use of hydrogen-embrittlement-resistant materials and robust sealing designs, leakage rates are reduced to near zero. Together with the boosting equipment, these components form a synergistic system-level solution that delivers enhanced performance and reliability.

2 Safe and Controlled

- Safety and controllability are critical considerations in the deployment of hydrogen products. The safety baseline of hydrogen applications lies in the reliability of core components, as risks such as hydrogen embrittlement fracture and high-pressure leakage may lead to serious accidents. HiFluid has established a full-process quality management system to build a robust safety barrier from the source.
- Hydrogen compressors for refueling stations adopt a physical isolation design between hydraulic oil and hydrogen gas, completely eliminating the risk of oil contamination. The system output pressure covers mainstream operating conditions from 45 to 105Mpa. High-pressure tubing, fittings, and valves are certified to CE and ATEX explosion-proof standards, ensuring long-term operation in extreme environments.
- In terms of material selection, austenitic stainless steels are predominantly used. Pressure-bearing cylinders, end caps, and valve needles are manufactured from A286 alloy, valve bodies are made of 316L stainless steel, and high-pressure tubing consists of seamless 316/316L stainless steel pipes with a nickel content of no less than 12%. This material strategy minimizes hydrogen embrittlement risks while ensuring high durability.

3 Cost Optimization and Supply Chain Security

- Cost optimization and supply chain security provide a dual layer of assurance. For a long time, China's dependence on imported core hydrogen components reached as high as 85%, resulting in high procurement costs and extended delivery lead times.
- Through localized innovation, HiFluid has broken existing monopolies. Its self-developed boosters and high-pressure tubing and valve components significantly reduce the cost of core equipment. Supported by a complete technical value chain, HiFluid delivers one-stop services ranging from system design to after-sales support, substantially shortening delivery cycles.

  This vertically integrated capability also mitigates risks associated with global supply chain volatility. At the PTC Asia 2025 exhibition, HiFluid's products attracted strong interest from customers across Europe, Southeast Asia, and other regions, highlighting the market value of localized alternatives.

Application of HiFluid Products in the Hydrogen Value Chain
—Production and Compression

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Hydrogen production and compression represent the starting point of the green hydrogen value chain. The core objective of this stage is to safely, efficiently, and reliably complete hydrogen generation, drying, purification, and pressurization from the electrolyzer outlet to the compressor inlet.

This stage typically consists of multiple continuous subsystems and imposes extremely stringent requirements on the cleanliness, sealing performance, and resistance to hydrogen embrittlement of fluid control equipment. Leveraging its deep technical expertise in high-pressure fluid control, HiFluid provides end-to-end solutions covering the entire process from the electrolyzer outlet to the compression system.

System Characteristics of Hydrogen Production and Compression

Green hydrogen production primarily adopts alkaline electrolysis (ALK), proton exchange membrane electrolysis (PEM), and solid oxide electrolysis (SOEC) technologies. Typical characteristics include:

Complex wet-hydrogen environments

Electrolytic hydrogen contains water vapor and trace impurities, imposing stringent requirements on sealing materials and corrosion resistance.

Continuous operation with pulsating inputs

Hydrogen output from electrolysis systems exhibits significant fluctuations, placing high demands on the stability of buffer tanks and pressure-regulating valves.

Clearly defined pressurization requirements

Electrolyzer outlet pressure typically ranges from 1.6 to 4Mpa and must be stepwise increased to 35–70MPa or even higher levels.

High safety classification

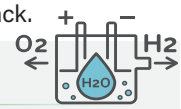
Strict requirements apply to explosion protection, backflow prevention, and contamination control.

HiFluid's product portfolio is designed around key requirements such as cleanliness, high-pressure capability, resistance to hydrogen embrittlement, and automatic pressure stabilization. This ensures that hydrogen production and compression processes remain fully controllable, measurable, and protected.

Application of HiFluid Products in Hydrogen Production and Compression Systems

Electrolyzer Outlet and Manifold Systems

Used for primary isolation and collection of wet hydrogen immediately after it exits the electrolyzer stack.



Typical Products

- Hydrogen-Specific Shut-off Valves and Needle Valves
- Check Valves (Backflow Prevention)
- Primary Filters

Key Features

- All-metal sealing or wet-hydrogen-resistant sealing structures
- Hydrogen-embrittlement-resistant materials such as 316L and A286
- Low-leakage design suitable for high-flow wet hydrogen operating conditions

Application of HiFluid Products in the Hydrogen Value Chain
—Production and Compression

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Hydrogen Drying and Purification Systems

Used to treat wet hydrogen through condensation, adsorption, and molecular sieve drying processes, enabling the gas to meet the purity requirements for downstream compression and storage.

Typical Products

- Switching Valve Manifolds (Regeneration / Adsorption Switching for Dual-Tower Drying Systems)
- High-Precision Filters
- Needle Valves and Check Valves
- Online Sampling Valves for Monitoring

Key Features

- Low dead-volume internal design to minimize gas retention
- Polished flow paths to reduce adsorption losses
- Support for high-frequency switching with long-term reliability

Buffer Storage and Pressure Stabilization Systems

Used to treat wet hydrogen through condensation, adsorption, and molecular sieve drying processes, enabling the gas to meet the purity requirements for downstream compression and storage.

Typical Products

- Double Block and Bleed (DBB) Valves (for Maintenance Isolation and Safe Venting)
- Needle Valves and Metal-Seated Valves
- Safety Relief Valves

Key Features

- Adapted to frequent start–stop operation and low-frequency pressure cycling
- Effective prevention of buffer tank overpressure
- Designed for long-term operation in wet hydrogen environments

Buffer Storage and Pressure Stabilization Systems

Hydrogen gas discharged from the electrolyzer can be further pressurized by diaphragm compressors, electrically driven compressors, or HiFluid gas boosters.

Typical Products

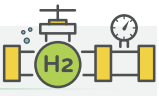
- Medium- and High-Pressure Needle and Shut-off Valves
- Check Valves (Low Cracking Pressure)
- High-Pressure Filters
- Tubing Systems

Key Features

- Prevention of high-pressure backflow to protect compressors from damage
- Provision of clean gas supply to avoid compressor contamination
- Long-term sealing performance maintained under pulsating operating conditions

Gas Boosting and Pressure Stabilization Systems

HiFluid's pneumatically driven and hydraulically driven gas boosters are suitable for pressure stabilization, pressure compensation, and circulation transport in green hydrogen production systems. They can serve as complementary solutions to compressors or, in certain applications, as alternative pressurization equipment.



Typical Products

- Air Driven Gas Boosters
- Hydraulically Driven Gas Boosters
- Tubing Systems

Key Features

- Completely oil-free compression, eliminating contamination
- Automatic start–stop with constant pressure output
- 1–105MPa Output pressure range from 1 to 105MPa

Application of HiFluid Products in the Hydrogen Value Chain
—Production and Compression

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Examples of HiFluid Product Applications

HiFluid's products are widely applied at critical points throughout the process from the electrolyzer outlet to the compressor inlet, including key interfaces and control nodes across the system.

Application Stages	Typical Pressure Range	Main Product Types
Electrolyzer Outlet	1.6-4MPa	Needle Valves, Check Valves
Drying System	2-10MPa	Switching Valve Manifolds, Filters, Check Valves
Buffer Storage Vessels	5-30MPa	Double Block and Bleed Valves, Safety Relief Valves
Compression Interfaces	5-70MPa	High-Pressure Needle Valves, Tubing and Fittings
Pressure Boosting Control	35-105MPa	Air and Hydraulically Driven Gas Boosters

Application of HiFluid Products in the Hydrogen Value Chain
—Storage and Transportation

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Hydrogen storage and transportation serve as the critical link between hydrogen production and end use. The core objective is to enable the safe, efficient, and contamination-free transfer and dispatch of hydrogen across different pressure levels and physical states. HiFluid's high-pressure fluid control technologies are extensively applied in hydrogen storage and transportation systems, providing end-to-end safety assurance for the hydrogen supply chain.

System Characteristics of Storage and Transportation

Hydrogen Storage and Transportation Modes

Gaseous

(Tube trailers, ground storage tanks, containerized storage and transportation modules)

— Mainstream Approach

Liquid

Cryogenic liquid hydrogen tanks, port logistics, and aerospace transportation

Solid-State

Research and demonstration stage

Common Challenges

01	Material safety under high-pressure or low-temperature conditions (hydrogen embrittlement resistance, permeation resistance)
02	Fatigue risks caused by rapid start–stop operation and frequent pressure cycling
03	Gas balancing and backflow prevention under multi-vessel parallel operation

HiFluid's product design is developed specifically around these requirements, ensuring that hydrogen storage and transportation processes remain fully controllable, measurable, and protected.

Application of HiFluid Products in Storage and Transportation Systems

Buffer Storage and Pressure Stabilization Systems

Applied in hydrogen refueling station storage areas, fixed hydrogen storage systems in industrial parks, and mobile tube trailer systems.

Typical Products

- High-pressure needle valves: control filling and discharging of cylinder banks
- Double block and bleed valves: enable rapid isolation and safe venting
- Check valves: prevent gas backflow
- Filters: ensure hydrogen purity and protect downstream equipment

Key Features

- Hydrogen-embrittlement-resistant materials (316L, A286)
- Validated through helium leak testing and pressure cycling tests
- Optional anti-vibration mounts and vibration-resistant fittings for mobile applications

Storage and Transportation Manifold and Piping Systems

Used to connect hydrogen cylinder banks, compressors, and dispensers, enabling multi-cylinder parallel operation and flexible gas circuit switching.

Typical Products

- High-pressure cone-and-thread connections with working pressures up to 138Mpa
- Multi-port needle valves / switching manifolds for gas source selection and pressure equalization
- Safety relief components for rapid venting during abnormal overpressure conditions

Key Features

- Modular design with fewer leakage points, enabling easy installation and maintenance
- Compatible with different storage pressure levels, from medium to ultra-high pressure
- Customized manifold assemblies available based on project layout

Application of HiFluid Products in the Hydrogen Value Chain
—Storage and Transportation

HIFLUID

Transportation and Loading/Unloading Interface Systems

Applied to loading, unloading, venting, and inspection interfaces of transportation equipment such as tube trailers, containerized storage modules, and liquid hydrogen tanks.

Typical Products

- Air and hydraulically driven gas boosters for oil-free hydrogen filling and discharge
- Safety valves and rupture discs providing dual protection for transportation safety
- Manual or pneumatically actuated shut-off valves for local operation and remote control

Key Features

- Equipped with automatic start–stop and pressure-holding functions
- Compliant with ISO 19880 and GB/T 35544 hydrogen equipment standards
- Supports integration of intelligent monitoring and sensor interfaces

Future Development Trends

Embrace the future

- Hydrogen storage and transportation equipment is evolving toward higher operating pressures, lighter-weight materials, and higher levels of system integration.
- Refueling and transportation interfaces are increasingly moving toward modularization, quick-connect designs, and intelligent operation.

- HiFluid will continue to focus on:
  - Hydrogen-embrittlement-resistant materials and surface treatment technologies for high-pressure hydrogen systems;
  - Customizable storage and transportation manifold systems and safety valve modules;
  - Integrated digital monitoring interface solutions to support full-lifecycle safety management of hydrogen storage and transportation systems.

Examples of HiFluid Product Applications

Application Stages	Pressure Range	Main Product Types
Hydrogen Cylinder Banks / Buffer Storage Vessels	3-30MPa	Needle Valves, Double Block and Bleed Valves, Safety Relief Valves
Tube Trailers and Mobile Storage & Transportation	3-30MPa	Needle Valves, Check Valves
High-Pressure Gas Storage Modules	70-105MPa	High-Pressure Valves, Fittings, and Tubing Systems
Gas Loading and Unloading Interfaces	35-105MPa	Air and Hydraulically Driven Gas Boosters, Quick-Connect Components

Application of HiFluid Products in the Hydrogen Value Chain
—Refueling and Distribution

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Hydrogen refueling and distribution systems connect high-pressure hydrogen storage areas with end-use vehicles or hydrogen-consuming equipment. They represent one of the most demanding segments within hydrogen infrastructure in terms of safety, operational stability, and hydrogen cleanliness. Such systems typically include key modules such as pressure cascade switching, refueling control, hose depressurization, return gas handling, and filtration protection.

HiFluid provides a comprehensive portfolio of hydrogen pressurization systems, high-pressure valves, and fluid connection products for both 35Mpa and 70Mpa hydrogen refueling pressure standards, ensuring safe and reliable operation across mainstream refueling architectures.

Characteristics of the Refueling Process

Hydrogen refueling systems generally consist of the following core submodules.

- Cascade Pressure Management Systems for Storage Areas
- Hydrogen Nozzle Hoses and Depressurization Systems
- Main Valve Manifolds and Control Manifolds for Dispensers
- Return Gas Piping and Filtration Systems

Together, these modules perform functions such as pressure control, gas flow regulation, temperature rise management, and safe venting, ensuring both refueling efficiency and operational safety.

Application of HiFluid Products in Hydrogen Refueling Systems

Cascade Switching and Pressure Distribution

Used for automatic or manual pressure switching among the three-stage storage zones (low-, medium-, and high-pressure zones) in hydrogen refueling stations.

Typical Products

- High-Pressure Needle Valves and Ball Valves
- Double Block and Bleed Valves
- Check Valves

Key Features

- Precise control of refueling pressure, increased refueling speed.
- Prevention of gas backflow between different pressure levels
- Facilitates maintenance and ensures safe isolation

Dispenser Valve Blocks and Control Manifolds

Connect hydrogen nozzles, return gas lines, and temperature and pressure sensors, serving as the core control components of hydrogen dispensers.

Typical Products

- Manually Operated Needle Valves
  Pneumatically Actuated Needle Valves
- Filters
- High-Pressure Fittings and Tubing

Key Features

- Designed to withstand frequent refueling cycles with stable and reliable sealing performance
- Smooth internal flow paths to reduce pressure drop and noise
- Support for customized compact valve block designs

Application of HiFluid Products in the Hydrogen Value Chain
—Refueling and Distribution

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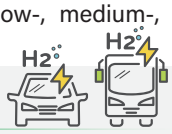
Dispenser Valve Blocks and Control Manifolds

Used for automatic or manual pressure switching among the three-stage storage zones (low-, medium-, and high-pressure zones) in hydrogen refueling stations.



Typical Products

- Hose Depressurization Valves
- Return Gas Piping, Filters
- Check Valves

Key Features

- Rapid depressurization to shorten refueling time
- Prevention of hydrogen retention to eliminate potential safety risks
- Assurance of return gas cleanliness to protect downstream compressors

Summary of HiFluid Advantages in Hydrogen Refueling Systems

- Hydrogen-embrittlement-resistant materials are used (316L, A286)
- All high-pressure valves are validated through helium leak testing and pressure cycling tests
- Complete tubing and valve system solutions are provided
- Supports customized design and rapid delivery of dispenser valve block manifolds

Examples of HiFluid Product Applications

Application Stages	Pressure Range	Main Product Types
Hydrogen Pressurization	35-105MPa	Air and Hydraulically Driven Gas Boosters
Pressure Cascade Switching	35-95MPa	Needle Valves, Double Block and Bleed Valves, Check Valves
Main Valve Manifold of Dispenser	70-95MPa (Passenger Vehicles)/ 35MPa (Commercial Vehicles)	Manually Operated Needle Valves, NC/NO Pneumatically Actuated Needle Valves, Metal-Seated Valves, Filters (5 / 30 μm), High-Pressure Fittings and Tubing
Hose Depressurization System	0–7MPa (Depressurization Side)/ 35-70MPa (Refueling Side)	Hose Depressurization Valves, Check Valves, Filters
Return Gas and Circulation Piping	2-20MPa	Filters, Needle Valves, Check Valves
Dispenser Safety Protection Modules	35-70MPa	Safety Relief Valves, Safety Isolation Valves
Filling Machine Internal Connection Module	20-138MPa	Tubing Connection System, Adapter

Application of HiFluid Products in the Hydrogen Value Chain
—Testing and R&D

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Testing and R&D processes cover hydrogen material validation, component testing, system evaluation, and certification, forming the foundation for the development of fuel cell vehicles, hydrogen storage equipment, and hydrogen refueling systems. This stage typically involves high-pressure testing, leak detection, cyclic durability testing, and burst testing, placing significantly higher reliability requirements on fluid control equipment than those encountered under conventional operating conditions.

Characteristics of Testing and Validation Scenarios

Common Testing Types in the Hydrogen Industry Include

- Pressure Proof and Burst Testing
- Gas Tightness and Leak Testing
- Pressure Cycling and Fatigue Testing
- Flow Rate and Valve Performance Testing
- Environmental Simulation Testing

These tests often involve repeated high-pressure start–stop operations, placing stringent requirements on the reliability and stability of the testing systems.

Typical Applications of HiFluid Products in Testing Systems

Hydrostatic Burst Test System

Used for pressure proof and burst testing of hydrogen cylinders, valves, fittings, hoses, and other test specimens.

Typical Products

- Air Driven Liquid Pumps
- High-Pressure Needle Valves
- Pressure Measurement Interfaces and Adapter Fittings

Key Features

- Enables stable pressurization exceeding 300MPa
- Supports automatic start–stop operation with pressure holding capability
- Fully oil-free system to prevent contamination of test specimens

Helium Leak Detection and Gas Tightness Test System

Helium is widely used as the leak detection medium in hydrogen equipment.

Typical Products

- Air and Hydraulically Driven Gas Boosters
- High-Pressure Needle Valves, Check Valves
- Filters
  (to prevent helium contamination of instruments)
- Vacuum / Positive Pressure Combination Valve Manifolds

Key Features

- Helium test pressure up to 180Mpa
- Ultra-low leakage rate design ($\leqslant 1\times10^{-8}$mbar · L/s)
- Low dead-volume design to minimize residual gas
- Suitable for both laboratory environments and mass production lines

Application of HiFluid Products in the Hydrogen Value Chain
—Testing and R&D

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Cyclic Durability and Pulse Test System

Simulates pressure cycling conditions of hydrogen storage and refueling systems to verify service life characteristics.

Typical Products

- Gas Boosting and Pressure Stabilization Modules
- High-Frequency Needle Valves and Automatic Switching Valves
- Pressure Control Valves and Pulsation Devices

Key Features

- Adapted for high-frequency start–stop operation and rapid cycling
- Supports automatic start–stop operation with pressure holding capability
- Fully oil-free system to prevent contamination of test specimens

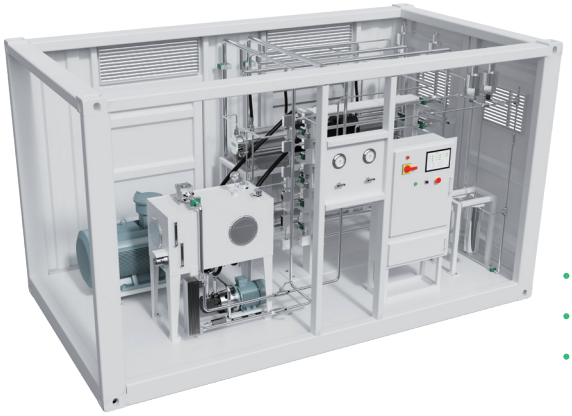
Examples of HiFluid Product Applications

Application Stages	Pressure Range	Main Product Types
Pressure Proof / Burst Testing	0–300MPa	Air Driven Gas Boosters, Hydraulically Driven Gas Boosters, High-Pressure Needle Valves, Safety Relief Valves
Gas Tightness / Helium Leak Detection Testing	Vacuum to 150Mpa	Needle Valves, Check Valves, Vacuum/Positive Pressure Combination Valve Assembly, Filter
Pressure Cycling / Fatigue Testing	1–150MPa	Air Driven Liquid Pumps, Hydraulically Driven Gas Boosters, Pressure Stabilization Module,High-Frequency Switching Valves, Automatic Switching Valve,Pulsation Damping Component
Flow Rate / Cv Test Systems	0–150MPa	Precision Adjustable Flow Needle Valves, Metal-Seated Valves, Tubing and Fitting Systems
Extreme Temperature and Pressure Environmental Testing	1–150MPa	High-Pressure Needle Valves, Special Sealing Valves, Temperature-Resistant Tubing Components
Hydrogen Cylinder and Storage System Testing	30-150MPa	Hydraulically Driven Gas Boosters, Needle Valves, Check Valves, Pressure Control Valves, Flow Control Valves
Laboratory / Research High-Pressure Systems	2–150MPa	Filters, Needle Valves, Check Valves, Precision Fittings

Packaged Systems

HIFLUID

—Hydrogen Compressor for Hydrogen Refueling



- ISO 17268
- ISO 19880-1
- ISO 19880-3

HiFluid independently developed Hydrogen Compressor for Hydrogen Refueling integrates a hydraulically driven gas booster, hydraulic power unit, cooling system, precision control cabinet, valves, instruments, and safety features into a mobile, skid-mounted steel structure. By using high-pressure hydraulic oil to directly drive pistons for hydrogen compression, the system achieves complete physical isolation between hydrogen and hydraulic oil. This design fundamentally eliminates the risk of oil contamination, ensuring the purity of the output hydrogen.

The hydrogen compressor adopts closed-loop pump drive technology, enabling real-time dynamic adjustment of load power and an intelligent shift from “continuous power supply” to “on-demand power supply.” This effectively eliminates throttling and overflow losses, significantly reducing energy consumption costs. At the same time, the closed-loop system integrates key components such as a charge pump, safety valves, and flushing valves, simplifying the hydraulic system architecture, reducing equipment weight, and saving installation space.

This system serves not only as the critical boosting unit for achieving 35MPa or 70MPa high-pressure refueling in hydrogen refueling stations (HRS), but is also widely applicable in green hydrogen production, hydrogen cylinder filling, chemical hydrogenation processes, and high pressure hydrogen cylinder testing scenarios. It provides a reliable, modular solution for safe, efficient, and pure hydrogen compression.

Application Scenario	Hydrogen Filling	Integrated Hydrogen Production and Refueling Station	Mobile Hydrogen Refueling Station	Mobile Hydrogen Refueling Station
Hydrogen Source	Hydrogen Production Equipment / By-product Hydrogen from Chemical Processes	Hydrogen Production Equipment / By-product Hydrogen from Chemical Processes	Hydrogen Production Equipment / 20Mpa Tube Trailer	Hydrogen Production Equipment / 20Mpa Tube Trailer
Discharge Pressure	22MPa	45MPa	35MPa	70MPa
Compressor Model	HFGC-260-220-H_2	HFGC-260-450-H_2	HFGC-260-350-H_2	HFGC-260-700-H_2
Flow Rate Class	260kg/12h (25°C, 2.5MPa)	260kg/12h (25°C, 2.5MPa)	260kg/12h (25°C, 5MPa)	260kg/12h (25°C, 5MPa)
Inlet Pressure Range	1.5-20MPa	1.5-20MPa	2-20MPa	2-20MPa
Inlet Gas Temperature	⩽45°C	⩽45°C	⩽45°C	⩽45°C
Discharge Gas Temperature	⩽30°C	⩽30°C	⩽30°C	⩽30°C
Drive Type	Hydraulically Driven	Hydraulically Driven	Hydraulically Driven	Hydraulically Driven
Explosion-Proof Rating	Ex db IIC T4	Ex db IIC T4	Ex db IIC T4	Ex db IIC T4
Installed Power	55kW	80kW	60kW	60kW
Control Mode	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support
Cooling Method	Closed-Loop Water Cooling	Closed-Loop Water Cooling	Closed-Loop Water Cooling	Closed-Loop Water Cooling
Cooling Water Pressure	0.2-0.4MPa	0.2-0.4MPa	0.2-0.4MPa	0.2-0.4MPa
Cooling Water Temperature	7-20°C	7-20°C	7-20°C	7-20°C
Cooling Water Flow Rate	12m^3/h	18m^3/h	12m^3/h	12m^3/h
Equipment Dimensions	4500*2438*2591mm	8500*2438*2591mm	4000*2438*2591mm	4000*2438*2591mm

Packaged Systems

HIFLUID

—Hydrogen Compressor for Hydrogen Refueling

Application Scenario	Hydrogen Refueling Station	Hydrogen Refueling Station	Hydrogen Refueling Station	Hydrogen Refueling Station	Hydrogen Refueling Station
Hydrogen Source	20MPa Tube Trailer	20MPa Tube Trailer	45Mpa High-Pressure Storage Tank	20MPa Tube Trailer	45Mpa High-Pressure Storage Tank
Discharge Pressure	45MPa	90MPa	90MPa	45MPa	90MPa
Compressor Model	HFGC-500-450-H_2	HFGC-500-900-H_2	HFGC-500-900-H_2	HFGC-1000-450-H_2	HFGC-1000-900-H_2
Flow Rate Class	500kg/12h (25°C, 12.5MPa)	500kg/12h (25°C, 12.5MPa)	500kg/12h (25°C, 30MPa)	1000kg/12h (25°C, 12.5MPa)	1000kg/12h (25°C, 30MPa)
Inlet Pressure Range	5-20MPa	5-20MPa	20-45MPa	5-20MPa	20-45MPa
Inlet Gas Temperature	⩽45°C	⩽45°C	⩽45°C	⩽45°C	⩽45°C
Discharge Gas Temperature	⩽30°C	⩽30°C	⩽30°C	⩽30°C	⩽30°C
Drive Type	Hydraulically Driven	Hydraulically Driven	Hydraulically Driven	Hydraulically Driven	Hydraulically Driven
Explosion-Proof Rating	Ex db IIC T4	Ex db IIC T4	Ex db IIC T4	Ex db IIC T4	Ex db IIC T4
Installed Power	80kW	90kW	60kW	120kW	115kW
Control Mode	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support	PLC + Touchscreen with Remote Station Control Support
Cooling Method	Closed-Loop Water Cooling	Closed-Loop Water Cooling	Closed-Loop Water Cooling	Closed-Loop Water Cooling	Closed-Loop Water Cooling
Cooling Water Pressure	0.2-0.4MPa	0.2-0.4MPa	0.2-0.4MPa	0.2-0.4MPa	0.2-0.4MPa
Cooling Water Temperature	7-20°C	7-20°C	7-20°C	7-20°C	7-20°C
Cooling Water Flow Rate	18m^3/h	18m^3/h	12m^3/h	25m^3/h	25m^3/h
Equipment Dimensions	4000*2438*2591mm	8500*2438*2591mm	4000*2438*2591mm	8500*2438*2591mm	8500*2438*2591mm

▶ Performance Characteristics

- All electrical components and control systems feature intrinsically safe explosion-proof designs, certified to meet the unit's overall explosion-proof requirements.
- Equipped with a closed-loop pump drive, enabling automatic adjustment of output pressure and flow according to demand, delivering high efficiency and energy savings.
- The closed-loop system integrates key components such as a charge pump, safety valves, and flushing valves, simplifying the hydraulic system architecture, reducing overall weight, and saving installation space.
- Equipped with in-house hydraulically driven gas booster, the system delivers extended maintenance intervals, facilitates easy replacement of primary seals and significantly reduces downtime - minimizing total lifecycle operating costs.
- The system generates high-pressure, high-flow, contaminant-free hydrogen output, ideally suited for applications requiring frequent start-stop cycles.

▶ Typical Applications

Hydrogen refueling for fuel cell vehicles.

Pressure boosting at the outlet of hydrogen production systems to facilitate hydrogen storage and transportation.

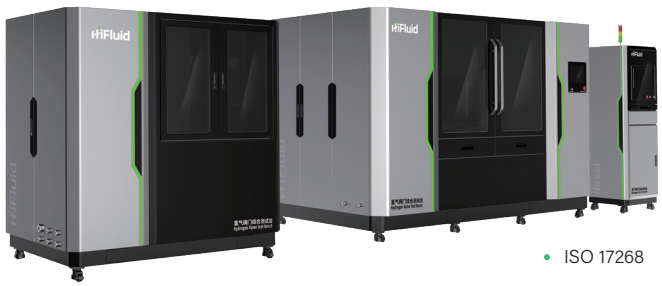
Providing necessary high-pressure conditions for key chemical reactions in green ammonia/methanol production while meeting pressure requirements for gas transfer, purification, and storage in the process flow.

Gas supply for hydrogen-related testing.

Packaged Systems

HIFLUID

—Hydrogen Valve Test System



- ISO 17268
- ISO 19880-1
- ISO 19880-3

HiFluid developed a Hydrogen Valve Test System for leak testing, electrical performance testing, and flow testing of cylinder valves, pressure regulators, and other hydrogen-related valves. The system supports test pressures up to 105MPa.

It complies with GTR13, ECE R134, ISO 12619, ANSI/CSA HPRD1, and ANSI/CSA HGV3.1 standards, and can be customized according to user requirements, providing a safe, efficient, stable, and reliable solution for hydrogen valve performance verification.

At the heart of the system is HiFluid's proprietary pneumatic gas booster, featuring a unique sealing design that requires no lubrication, ensuring contamination-free gas compression.

Beyond hydrogen storage equipment testing, HiFluid provides comprehensive valve testing solutions for industries including energy, chemicals, aerospace, aviation, and automotive, with a focus on safety, stability, intelligence, and customization.

Working Medium	Nitrogen, Helium–Nitrogen Mixture (Upgradeable to Hydrogen)
Test Pressure	⩾105Mpa
Minimum Detectable Leak Rate	$5*10^{-13}Pa•m^3/s$
Test Specimen Ambient Temperature	-40°C ~+85°C
Vacuum Chamber Internal Dimensions	Φ600 x 500mm
Drive Air Supply	0.7-1MPa, 5000LN/min

▶ Performance Characteristics

- Applicable for various testing media including hydrogen.
- Enables automatic switching and proportional mixing of different testing media.
- The core component, a gas booster, features a unique sealing structure that requires no lubrication, ensuring contamination-free compression of the medium.
- The vacuum chamber is embedded within a high-low temperature environmental chamber, enabling helium leak detection under varying temperature conditions.
- Test data is displayed in real-time or used to generate performance curves as needed, supporting remote test management and data monitoring.

▶ Typical Applications

Type testing and factory inspection during the valve development and production process.

Testing valve performance parameters for quality inspection units to ensure product quality meets relevant standards.

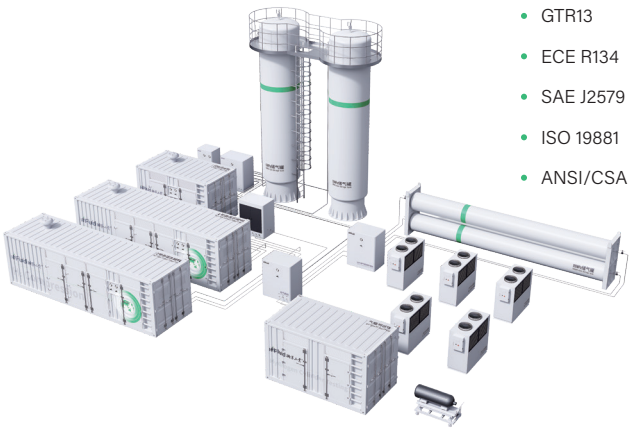
Performance testing of hydrogen valves after maintenance, with precise measurement of various performance indicators.

Research and academic institutions use the bench for the development, teaching, and experimental research of hydrogen valves and systems, providing precise testing data and experimental support for researchers, and serving as a platform for experimental teaching and training in universities.

Packaged Systems

HIFLUID

—Hydrogen Cylinder Hydrogen Cycle Test System



- GTR13
- ECE R134
- SAE J2579
- ISO 19881
- ANSI/CSA HGV 2

The Hydrogen Cylinder Hydrogen Cycle Test System, independently developed by HiFluid, is designed to evaluate fatigue life under extreme temperature conditions and varying hydrogen temperatures. The standard test pressure is 87.5MPa, with test environments ranging from −40°C to 85°C.

The system complies with major international standards, including GTR13, ECE R134, SAE J2579, ISO 19881, and ANSI/CSA HGV 2, and can be customized to meet specific customer requirements. It is also applicable to CNG cylinders or other pressure vessels requiring gas cycling tests.

Operation uses a hydrogen tube trailer as the primary source, with gas distributed via a discharge manifold into medium-pressure storage. When tube trailer pressure is low, the system switches to low-pressure storage, with a recovery compressor boosting pressure back into medium storage. A high-pressure compressor then raises the pressure further into a high-pressure hydrogen storage vessel.

Gas from the high-pressure vessel charges the test cylinder via a proportional valve, with a mass flow meter monitoring and maintaining flow. The closed-loop control of the proportional valve and flow meter ensures precise real-time adjustment of filling rate. During discharge, gas flows through the proportional valve and flow meter into low-pressure storage, with flow limited according to EFV safety thresholds. The recovery compressor re-pressurizes this gas back into medium storage, completing the test cycle.

Working Medium	Hydrogen
Maximum Specimen Volume	600L
Test Pressure	⩾105MPa
Pressurization Rate	⩽60g/s
Medium Temperature	-40~85℃
Ambient Temperature	-40~85℃

▶ Performance Characteristics

- The equipment is designed in compliance with hydrogen-related standards and meets the requirements for electrical explosion-proof ratings.
- It is suitable for cyclic testing of common gas cylinders (30–450L) with a maximum pressure of 87.5MPa.
- The compression system adopts a parallel multi-unit configuration, allowing for adjustment of the number of units activated based on cylinder size to reduce power consumption.

▶ Typical Applications

It is used for hydrogen cycle testing of hydrogen cylinders to verify whether the product meets technical specification requirements, serving as an essential step in the cylinder development process.

The system can also conduct type tests on CNG cylinders or other pressure vessels.

Packaged Systems

HIFLUID

—Hydrogen Cylinder Extreme Temperature Pressure Cycling Test System

- ISO 9809
- GTR13
- ECE R134
- SAE J2579
- ISO 19881
- ANSI/CSA HGV 2

Hydrogen Cylinder Extreme Temperature Pressure Cycling Test System, developed independently by HiFluid Industrial, this system is designed for fatigue life testing of hydrogen cylinders under ambient, extreme temperature, and multi-temperature medium conditions. It supports fatigue test pressures ⩾ 87.5Mpa, with medium and environmental temperatures ranging from −40°C to +85°C and humidity ⩾ 90%.

The system complies with international standards including GTR13, ECE R134, SAE J2579, ISO 19881, and ANSI/CSA HGV 2, and can be customized according to user-specific test requirements. It is also suitable for pressure cycling tests of other types of gas cylinders and pressure vessels.

As a highly integrated and specialized testing system, it precisely simulates the cyclic pressure, pulsation, and alternating loads that gas cylinders experience under real operating conditions. This allows for rapid and accurate verification of the structural strength, durability, and reliability of cylinder designs. Through its Accelerated Life Testing mode, the system can reproduce decades of cumulative fatigue damage within a short testing period, providing essential support for design improvement, material optimization, and process reliability validation.

Ultimately, it significantly enhances overall product quality and safety, strengthens market competitiveness, and establishes a solid technical foundation for durable, high-performance hydrogen products.

Maximum Specimen Volume	600L
Test Pressure	⩾105MPa
Peak Pressure	5~105MPa
Valley Pressure	1.5MPa
Working Medium	Water–Glycol or Other High-/Low-Temperature Media
Medium Temperature	-40~85℃
Pulse Frequency	Sine Wave ⩾1 cycle/min @ 450L Cylinder, Test Pressure 2–87.5Mpa
Pressure Control Accuracy	±0.5MPa
Test Waveform	Sine Wave, Trapezoidal Wave, Triangular Wave
Ambient Temperature	-40~85℃

▶ Performance Characteristics

- Wide Compatibility with Test Media: Supports various media such as water, oil, and glycol for different testing conditions.
- Specially Sealed Pulse Booster: Core component adopts a unique sealing structure that effectively extends maintenance intervals and reduces operating and maintenance costs.
- Modular Multi-booster Design: Multiple pulse boosters can operate in parallel, the number of active units can be flexibly adjusted based on cylinder volume, achieving low-power, energy-efficient operation.
- Advanced Real-time Data Acquisition System: Automatically records and generates pressure–time curves, temperature–time curves, and cycle count reports, providing direct data support for failure analysis and design optimization.
- Comprehensive Safety Protection System: Features automatic overpressure relief, real-time overtemperature alarm, and emergency shutdown functions, ensuring safe and reliable testing throughout the entire process.

—Hydrogen Cylinder Extreme Temperature Pressure Cycling Test System

▶ Typical Applications

Fatigue life testing of hydrogen cylinders under ambient and extreme temperature conditions to verify compliance with relevant technical standards.

Fatigue life testing of various types of gas cylinders and pressure vessels, including LNG cylinders, LPG cylinders, CNG cylinders, breathing apparatus cylinders, filament-wound cylinders, nitrogen cylinders, oxygen cylinders, argon cylinders, helium cylinders, fire-extinguisher cylinders, and hydraulic accumulators.

Pressure cycling, pressure holding, hydrostatic, and burst testing for hydrogen cylinders, pressure vessels, and other gas cylinders.

Packaged Systems

HIFLUID

—Hydrogen Cylinder Hydrostatic Burst Test System

- ISO 9809
- GTR13
- ECE R134
- SAE J2579
- ISO 19881
- ANSI/CSA HGV 2

Developed independently by HiFluid Industrial, the Hydrogen Cylinder Hydrostatic Burst Test System is designed for evaluating the pressure-bearing capability, overall safety performance, and reliability of high-pressure hydrogen cylinders, with test pressures reaching ⩾ 200Mpa.

The system complies with international standards including GTR13, ECE R134, SAE J2579, ISO 19881, and ANSI/CSA HGV 2. By simulating extreme pressure conditions, the system provides critical data for quality certification, type testing, and periodic inspection of hydrogen cylinders.

It can also be extended for hydrostatic and burst testing of other types of gas cylinders and pressure vessels, offering broad applicability for different industries and testing needs.

Under controlled conditions, water is used as the pressurization medium to apply a continuously increasing pressure to the hydrogen cylinder. The pressure is raised until the specified test pressure is reached and held for a defined period to verify the cylinder's strength and confirm the absence of macroscopic deformation. Pressurization is then continued until the cylinder ruptures, allowing precise measurement of its ultimate burst pressure. During the test, the system automatically generates pressure–time curves, burst pressure data, and other reports, providing essential data for failure analysis and design optimization.

Working Medium	Water (Upgradeable to Gas Burst Testing)
Test Pressure	0~300Mpa
Medium Temperature	Ambient Temperature (Optional High or Low Temperature)
Pressure Measurement Accuracy	±0.25%FS
Internal Dimensions of Burst Chamber	Φ800 x 2600mm
Control Mode	Manual / Automatic

▶ Performance Characteristics

- Reinforced Blast-resistant Test Chamber: engineered to fully withstand the extreme impact forces and fragment ejection generated during cylinder burst, ensuring maximum safety for both personnel and equipment.
- High Versatility and Compatibility: by changing fixtures and tooling, the system supports burst testing of composite cylinders with different specifications, including both metal-liner and plastic-liner designs.
- Wide Compatibility with Test Media: suitable for water, oil, glycol, and various other pressurization media to meet diverse testing requirements.
- Multi-layer Safety Interlock System: equipped with access control, pressure pre-alarm, and other protective mechanisms. The system automatically prevents pressurization if the chamber door is open or if abnormal parameters are detected, fundamentally eliminating the risk of operator error.
- Fully Automated Remote-controlled Testing: the entire testing process can be executed remotely through a computerized system, enabling unmanned operation and providing the highest level of operator safety.

▶ Typical Applications

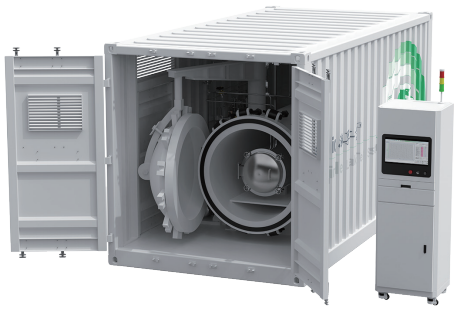
Type testing and factory acceptance testing of hydrogen cylinders during R&D and production to verify compliance with applicable technical standards.

Hydrostatic and burst testing of various gas cylinders and pressure vessels.

Packaged Systems

HIFLUID

—Hydrogen Cylinder Leak Test System



- ISO 9809
- GTR13
- ECE R134
- SAE J2579
- ISO 19881
- ANSI/CSA HGV 2

Developed independently by HiFluid Industrial, the Hydrogen Cylinder Leak Test System is designed for stringent leak detection of on-board hydrogen cylinders, supporting test pressures of ⩾ 87.5Mpa.

The system complies with international standards including GTR13, ECE R134, SAE J2579, ISO 19881, and ANSI/CSA HGV 2. The equipment is used for ultimate leak detection of various high-pressure hydrogen cylinders and hydrogen storage systems.

By simulating actual working pressure or performing overpressure testing, the system accurately identifies even extremely small leakage points with high sensitivity and precision, ensuring that every cylinder leaving the factory meets the most stringent leak-tightness requirements.

As the core vessel for hydrogen storage and transportation, the sealing integrity of a hydrogen cylinder is fundamental to the safe operation of the entire system. Even the slightest leakage can create significant safety risks, as well as energy loss and increased operating costs. HiFluid's Hydrogen Cylinder Leak Test System serves as a critical "safety gatekeeper," establishing a robust and reliable safety barrier for hydrogen storage and distribution.

Working Medium	Helium, Helium–Nitrogen Mixture
Test Pressure	⩾87.5MPa
Leak Detection Method	Helium Mass Spectrometer Leak Detector
Minimum Detectable Leak Rate	$5*10^{-13}Pa•m^3/s$
Pressure Measurement Accuracy	±0.25%FS
Control Mode	Manual / Automatic

▶ Performance Characteristics

- Integrated Multi-level Safety Protection: including explosion-proof design, real-time pressure monitoring, automatic overpressure alarms, and emergency shutdown functions to ensure absolute safety throughout the testing process.
- High Adaptability Across Cylinder Types: compatible with hydrogen cylinders of different volumes, interfaces, and pressure ratings, meeting the needs of laboratory R&D, pilot-scale testing, and mass production environments.
- Advanced Helium Mass Spectrometry Leak Detection: capable of reliably identifying extremely small leakage rates with sensitivity far exceeding industry standards.
- Fully Automated Testing Workflow: covering clamping, pressurization, holding, detection, result evaluation, and data recording without manual intervention. This significantly improves testing efficiency and repeatability while eliminating operator judgment errors.
- Comprehensive Automated Reporting: the system generates detailed test reports for every cylinder, including serial numbers, test parameters, pressure curves, and final results. All data can be permanently stored and traced, providing robust support for quality assurance systems.

▶ Typical Applications

Type testing and factory acceptance testing of hydrogen cylinders during R&D and production to verify compliance with relevant technical standards.

Leak-tightness testing of various gas cylinders and pressure vessels.

Leak-tightness testing of hydrogen storage systems across different application scenarios.

Packaged Systems

HIFLUID

—Hydrogen Cylinder Hydrostatic Test System

- ISO 9809
- GTR13
- ECE R134
- SAE J2579
- ISO 19881
- ANSI/CSA HGV 2

Developed independently by HiFluid Industrial, the Hydrogen Cylinder Hydrostatic Test System fully supports both the internal measurement method and external measurement method required for on-board hydrogen cylinder testing, with test pressures up to ⩾ 105Mpa.

The system complies with international standards including GTR13, ECE R134, SAE J2579, ISO 19881, and ANSI/CSA HGV 2. As a core testing solution for ensuring the safety and regulatory compliance of high-pressure hydrogen storage vessels, the system applies precisely controlled hydrostatic pressure and utilizes a high-accuracy volumetric measurement system to perform periodic inspections and factory acceptance tests for Type III and Type IV hydrogen cylinders used in fuel cell vehicles, hydrogen storage, and hydrogen distribution applications.

Through overpressure testing, this system provides a comprehensive verification of the cylinder's overall strength, sealing performance, and structural integrity. During the test, the system precisely measures the volumetric expansion of the cylinder—an essential criterion for evaluating whether the filament-wound layer has experienced irreversible damage or whether the liner has undergone plastic deformation.

Working Medium	Water
Test Pressure	⩾105MPa
Measurement Method	Internal Measurement Method / External Measurement Method
Pressure Measurement Accuracy	±0.25%FS
Deformation Measurement Accuracy	±0.1%FS
Control Mode	Manual / Automatic

▶ Performance Characteristics

- Strict Adherence to the International "Water as Test Medium" Standard: leveraging the extremely low compressibility of water, the system minimizes the energy released even in the event of a burst, achieving inherent safety in high-risk testing scenarios.
- Integrated Intelligent Multi-layer Safety Protection: equipped with automatic overpressure alarm and relief, electrical interlocks, remote control capability, and multiple hardware/software safety barriers to ensure all risks remain fully controlled within a safe operating envelope.
- High-precision Volumetric Measurement System: capable of accurately detecting the cylinder's elastic deformation and permanent residual deformation under high pressure.
- Fully Automated Testing Workflow: from water filling and air purging, pressurization, pressure holding, depressurization, to data acquisition, all steps can be executed automatically with a single command, greatly reducing human error.
- Automatic Data Recording and Compliant Reporting: test data are automatically logged, stored, and compiled into standardized electronic reports. All records are tamper-proof, supporting full lifecycle quality traceability and the stringent review requirements of certification bodies.

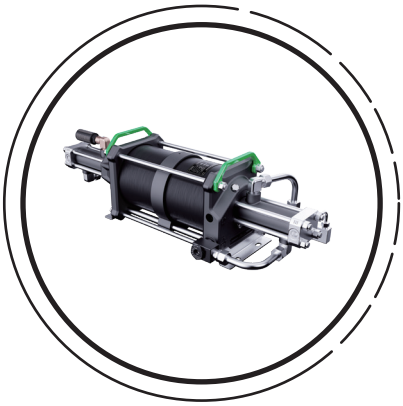
▶ Typical Applications

Type testing and factory acceptance testing of hydrogen cylinders during R&D and production to verify compliance with applicable technical standards.

Periodic in-service inspection of various gas cylinders and pressure vessels. By measuring high-precision volumetric expansion, the system evaluates whether the cylinder can continue to operate safely, effectively preventing potential failures caused by accumulated fatigue.

Core Components

—Air Driven Gas Boosters



The HFG series air driven gas boosters from HiFluid Industrial are designed for oil - free gas pressurization. A dynamic seal is adopted between the driving end and the pressurizing end to separate the two cavities, and a gas outlet is set up to prevent the medium gas from being contaminated. HiFluid Industrial pneumatic gas boosters are widely used in the oil - free compression of various industrial gases (such as nitrogen, hydrogen, argon, helium, methane, etc.), with a working pressure of up to 180Mpa.

Core Features

High Resistance to Hydrogen Embrittlement

Hydrogen-wetted materials such as A286 and 316L stainless steel are selected, providing excellent resistance to hydrogen embrittlement and effectively preventing hydrogen-induced degradation.

Oil-Free Compression

No lubricating oil is required, eliminating the risk of media contamination and ensuring high gas purity.

Intrinsic Safety

No electrical sparks are generated during operation, making the system suitable for flammable and explosive hydrogen environments and compliant with ATEX requirements.

Adapted for Frequent Start–Stop Operation

Unlimited continuous start–stop capability, making it particularly suitable for intermittent operating modes.

Automatic Pressure Balancing

Automatically stops once the target pressure is reached, resulting in zero energy consumption during pressure holding and delivering significant energy savings.

Simple Structure

No electrical connection required, low maintenance cost, almost maintenance-free.

Wide Pressure Range Coverage

Flexible pressure ratio combinations with stepless pressure regulation provide a wide output pressure range, meeting both low- and high-pressure media requirements.

Built-in Cooling

The built-in cooling system can rapidly cool the compressed gas.

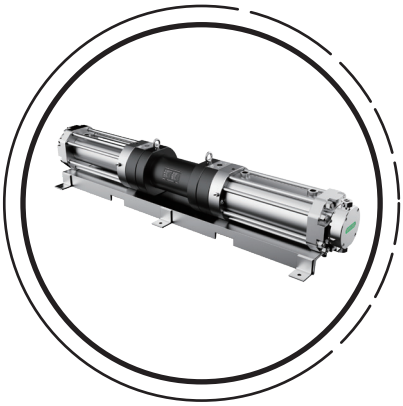
Typical Applications

- **Hydrogen Leak Testing**
  Provides high-pressure hydrogen for gas-tightness testing of cylinders, cylinder valves, and connecting pipelines.
- **Hydrogen Compatibility Testing**
  Establishes high-pressure hydrogen environments for large-scale pressure vessels used in material compatibility testing with hydrogen.
- **Hydrogen Cycling Testing**
  Provides both high- and low-pressure hydrogen sources for large-scale hydrogen cylinder pressure cycling tests.
- **Hydrogen Filling and Refueling**
  Enables contamination-free, high-flow hydrogen filling of cylinders, equipment, or systems, ensuring that required pressure levels are achieved.
- **Hydrogen Permeation Test**
  Provide high-pressure hydrogen to complete the material hydrogen permeation test.

Core Components

HIFLUID

—Hydraulically Driven Gas Boosters



The HFHG1 series hydraulically driven gas boosters developed by HiFluid use low-pressure hydraulic oil as the driving source to pressurize process gases to the required pressure levels. The standard design supports a maximum working pressure of up to 120Mpa, with customized designs available for higher pressure requirements.

Hydraulically driven gas boosters are particularly well suited for ultra-high-pressure and high-flow gas applications, delivering efficient and reliable performance under demanding operating conditions.

Core Features

High Resistance to Hydrogen Embrittlement

Hydrogen-wetted materials such as A286 and 316L stainless steel are selected, providing excellent resistance to hydrogen embrittlement and effectively preventing hydrogen-induced degradation.

Oil-Free Compression

No lubricating oil is required, eliminating the risk of media contamination and ensuring high gas purity.

Intrinsic Safety

No electrical sparks are generated during operation, making the system suitable for flammable and explosive hydrogen environments and compliant with ATEX requirements.

Adapted for Frequent Start–Stop Operation

Unlimited continuous start–stop capability, making it particularly suitable for intermittent operating modes.

Automatic Pressure Balancing

Automatically stops once the target pressure is reached, resulting in zero energy consumption during pressure holding and delivering significant energy savings.

Wide Pressure Range Coverage

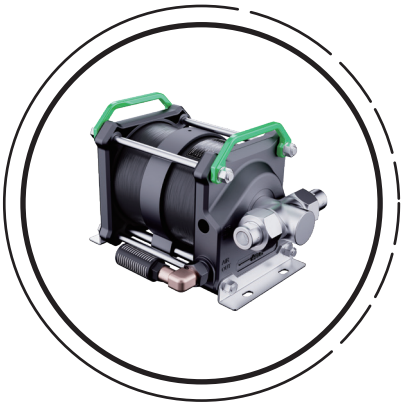
Flexible pressure ratio combinations with stepless pressure regulation provide a wide output pressure range, meeting both low- and high-pressure media requirements.

Typical Applications

- **Hydrogen Leak Testing**
  Provides high-pressure hydrogen for gas-tightness testing of cylinders, cylinder valves, and connecting pipelines.
- **Hydrogen Compatibility Testing**
  Establishes high-pressure hydrogen environments for large-scale pressure vessels used in material compatibility testing with hydrogen.
- **Hydrogen Filling and Refueling**
  Enables contamination-free, high-flow hydrogen filling of cylinders, equipment, or systems, ensuring that required pressure levels are achieved.
- **Hydrogen Cycling Testing**
  Provides both high- and low-pressure hydrogen sources for large-scale hydrogen cylinder pressure cycling tests.

Core Components

—Air Driven Liquid Pumps



The HFLG series air driven liquid pumps developed by HiFluid use compressed air as the driving source to pressurize liquid media to the required pressure levels. Designed for a wide range of liquids—including oil, water, and other special fluids—the pumps can achieve maximum output pressures of up to 600Mpa.

These pumps play a critical role across numerous application scenarios, particularly in explosion-proof environments where safety requirements are extremely stringent.

Core Features

Oil-Free Compression

No lubricating oil is required, eliminating the risk of media contamination and ensuring high gas purity.

Intrinsic Safety

No electrical sparks are generated during operation, making the system suitable for flammable and explosive hydrogen environments and compliant with ATEX requirements.

Adapted for Frequent Start–Stop Operation

Unlimited continuous start–stop capability, making it particularly suitable for intermittent operating modes.

Automatic Pressure Balancing

Automatically stops once the target pressure is reached, resulting in zero energy consumption during pressure holding and delivering significant energy savings.

Wide Pressure Range Coverage

Flexible pressure ratio combinations with stepless pressure regulation provide a wide output pressure range, meeting both low- and high-pressure media requirements.

High Compatibility

Suitable for use with most liquids and liquefied gases.

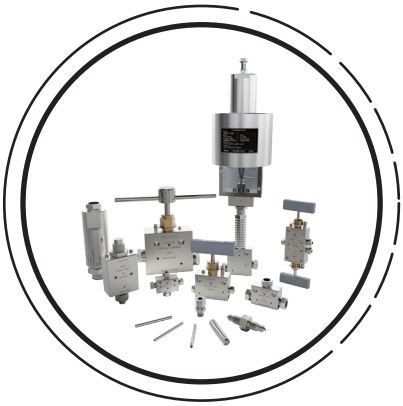
Typical Applications

- **Pressure Calibration, Verification, and Calibration**
  Provides stable hydraulic power for equipment calibration, verification, and calibration processes, ensuring measurement accuracy and reliability.
- **Fatigue Testing**
  Delivers cyclic high- and low-pressure output for durability and fatigue testing of gas cylinders, valves, and pipelines.
- **Pressure Proof and Burst Testing**
  Supplies high-pressure capability for pressure proof and burst testing of gas cylinders, valves, and piping systems.

Core Components

HIFLUID

—Valves, Fittings & Tubing



Ultra-high-pressure valves, fittings & tubing are critical core components for high-pressure energy transmission, flow control, and safety protection. HiFluid offers a comprehensive range of ultra-high-pressure tubing and valve products across multiple pressure ratings, widely applied in hydrogen compression, high-pressure testing, high-pressure processing, and hot isostatic pressing (HIP) applications within industries such as energy, food processing, and aerospace.

These products feature high mechanical strength, superior sealing performance, excellent corrosion resistance, and strong resistance to hydrogen embrittlement. With maximum working pressures of up to 1,034Mpa, HiFluid's ultra-high-pressure tubing and valve solutions are designed to ensure long-term stable operation under extreme conditions. The complete product portfolio comprehensively meets the diverse requirements of ultra-high-pressure systems.

Core Features

High Resistance to Hydrogen Embrittlement

Hydrogen-wetted materials such as A286 and 316L stainless steel are selected, providing excellent resistance to hydrogen embrittlement and effectively preventing hydrogen-induced degradation.

High-Pressure Stainless Steel Tubing

Specifically designed for hydrogen applications, high-nickel 316L stainless steel tubing is used, with a nickel content of ⩾12%, fully complying with relevant national standards.

Exceptional Pressure-Bearing Capability

Through the use of high-strength materials and optimized structural design, the products are capable of withstanding extremely high internal working pressures.

Outstanding Sealing Performance

An innovative composite sealing structure combining metal and polymer materials is employed. Even under severe conditions such as high-frequency pressure impacts and alternating hot and cold cycles, the design ensures long-term zero-leakage performance.

Excellent Durability

Validated through millions of pressure cycling fatigue tests, the products demonstrate outstanding corrosion resistance and durability. This significantly reduces equipment downtime and maintenance requirements, lowering total lifecycle operating costs.

Customized Services

In addition to standardized products, HiFluid offers full-process customized services—including technical consultation, solution design, and installation guidance—to precisely address the challenges of demanding on-site applications.

Typical Applications

- **Hydrogen Refueling Stations**
  Pipeline connections for hydrogen refueling stations, including internal piping and valve applications within skid-mounted hydrogen dispensers.
- **Hydrogen Production, Storage, and Transportation**
  Tubing and valve components applied across hydrogen production, storage, and transportation processes, capable of withstanding both high- and low-pressure conditions as well as pressure shocks, ensuring safe and efficient operation.
- **Hydrogen Testing Systems**
  Fluid connections for testing systems related to hydrogen valves, hydrogen cylinders, and other hydrogen-related components.
- **Hydrogen Cycling Testing**
  Provides both high- and low-pressure hydrogen sources for large-scale hydrogen cylinder pressure cycling tests.

HiFluid 瀚孚工業

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